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Advanced Wound Care Adhesives with New Functional Properties

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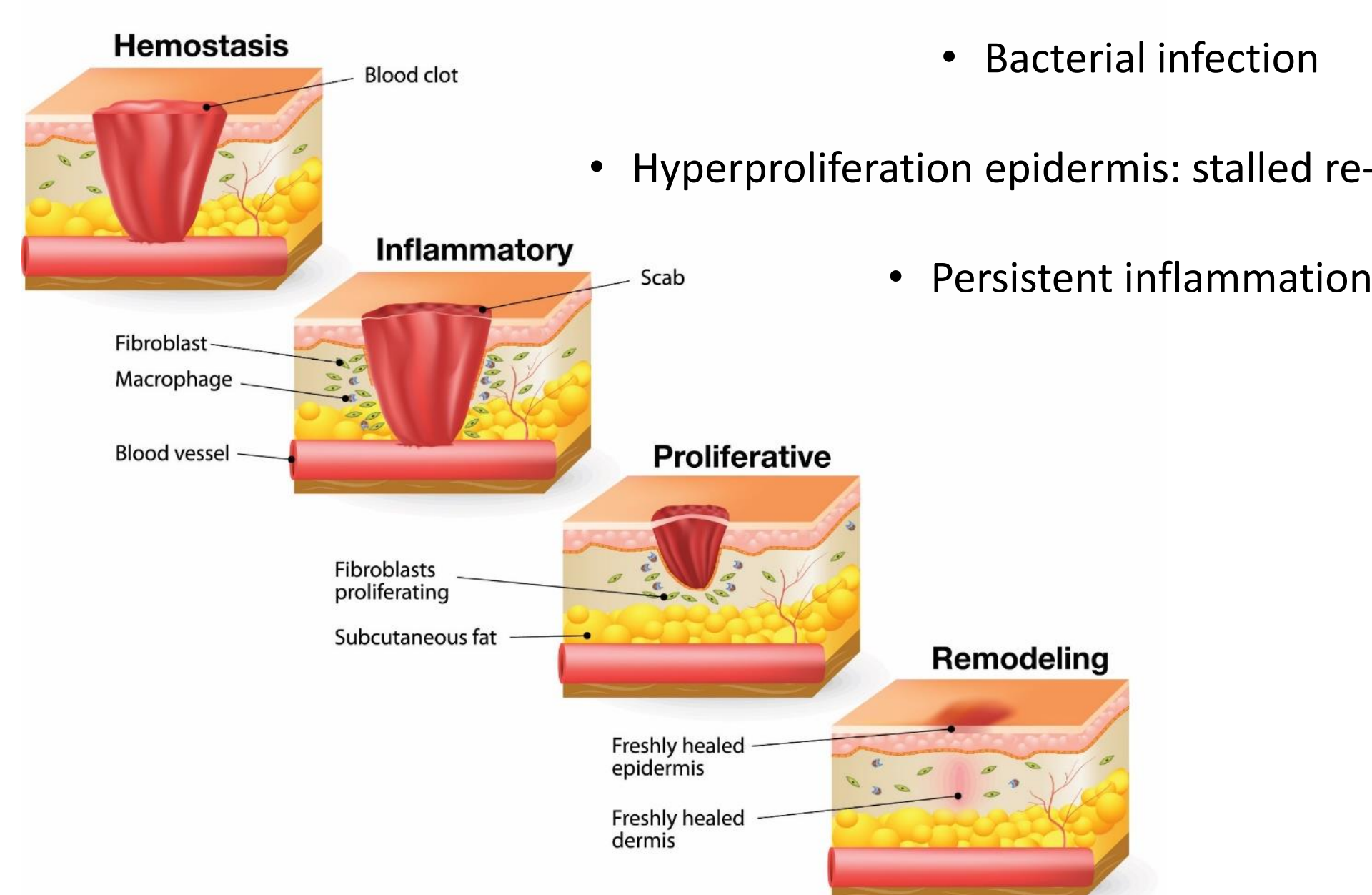
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2. Coloplast A/S, Humlebæk, Denmark

Introduction

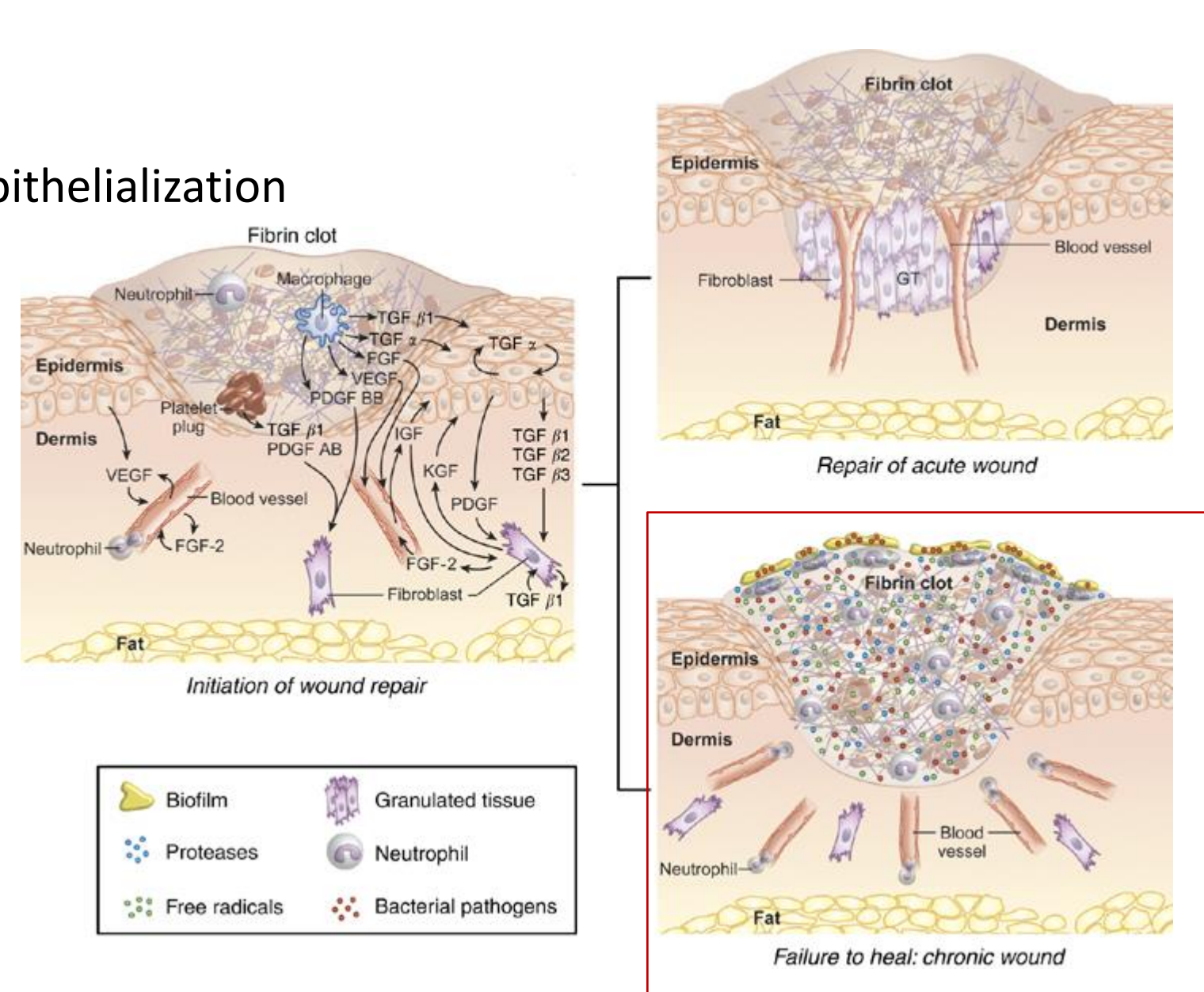
Wound healing is a dynamic process characterized by three overlapping cellular phases: inflammation, new tissue formation, and remodeling. Chronic wounds, which are often manifested in elderly and diabetic patients, result from anomalies in the cellular and molecular wound repair mechanism. Such wounds can lead to significant disability, amputation and increased mortality. The understanding of the normal wound healing mechanism and the consideration of the complexity of the wound environment, given by, e.g., hypoxia or bacterial infections, are crucial factors in order to develop an effective therapeutic approach^{1,2}. Here, we propose a novel, skin-friendly, industrially relevant silicone/glycerol hybrid adhesive with new functional properties, including: improved moisture handling due to the incorporation of emulsified glycerol and dispersion of active compounds by glycerol-embedding³. This particular matrix paves the way for an innovative drug delivery system. Various parameters will be taken into account in order to develop a relevant adhesive, in particular glycerol content, glycerol domain size and adhesive thickness.

Background

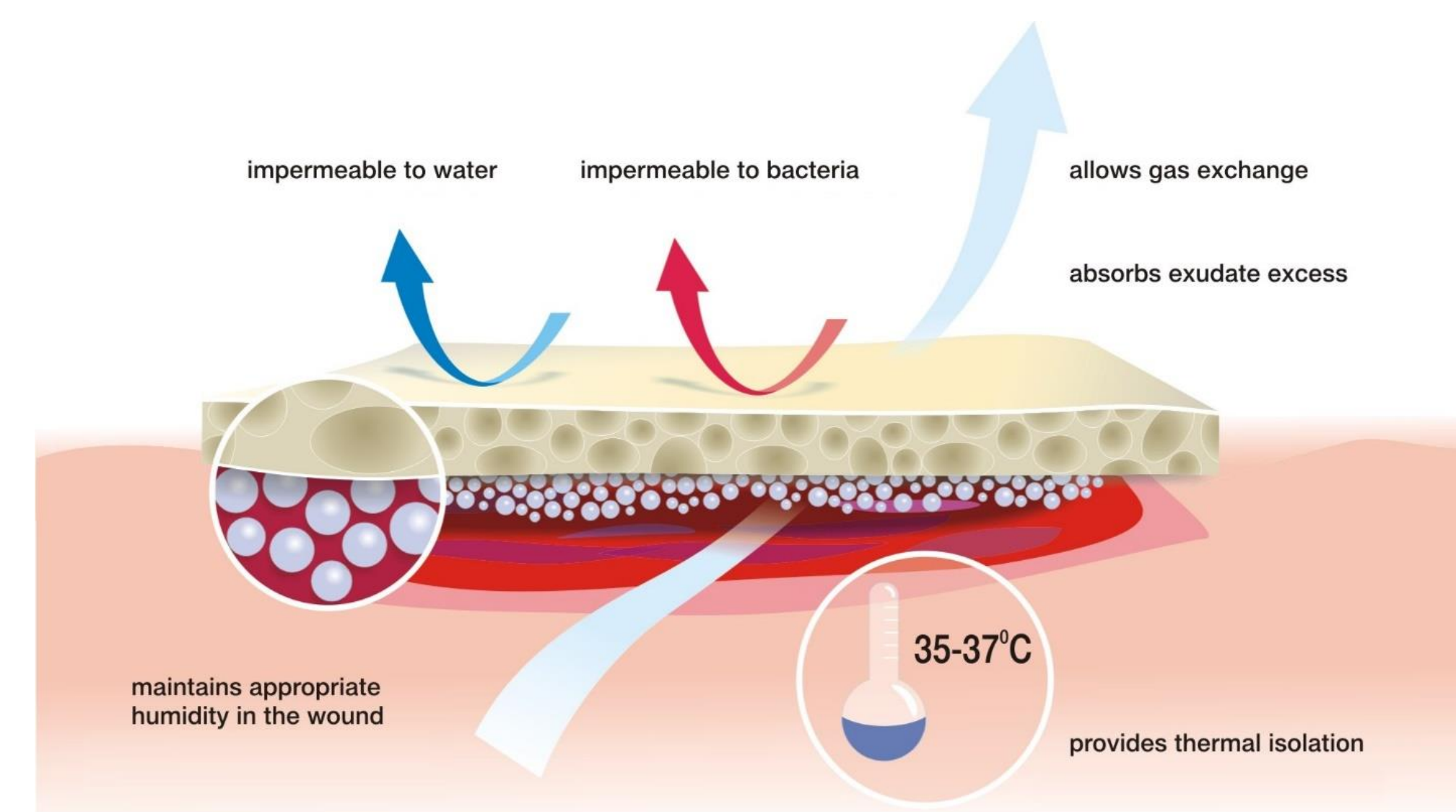
Wound Healing: 4 Cellular Phases



Chronic Wound Healing Process

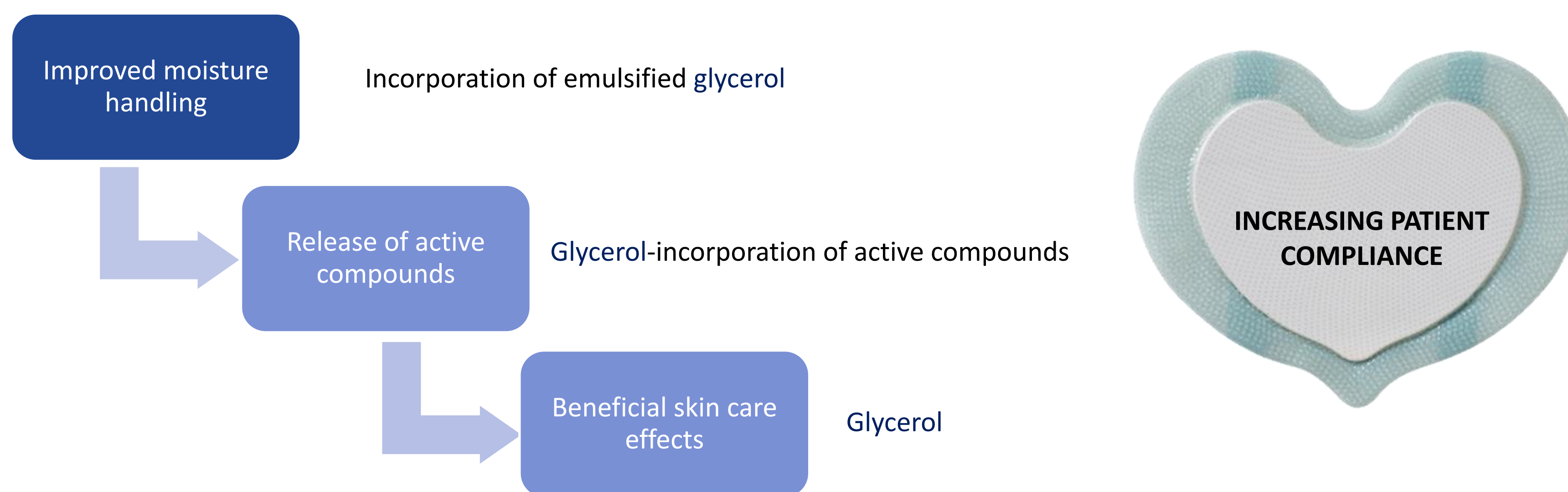


Focus: Appropriate Dressing for Appropriate Wound Environment

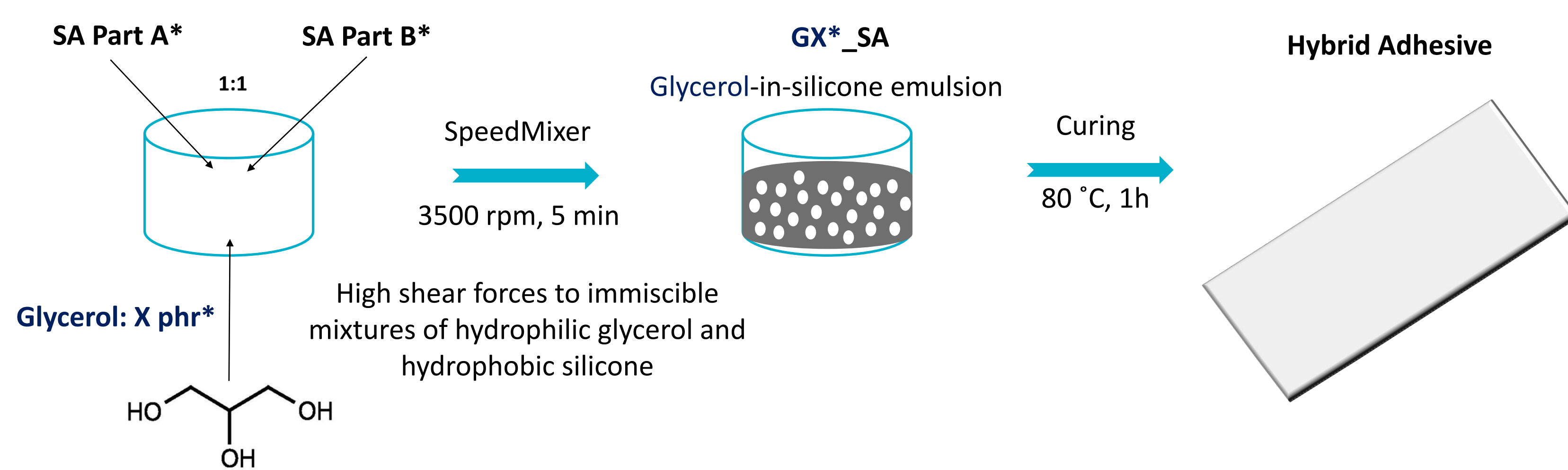


Development of Novel, Skin-Friendly Glycerol-Silicone Hybrid Adhesive

Silicone Adhesives – Gentle Skin Adhesion Properties



Experimental Work and Results



SA*: S stands for silicone, A stands for adhesive.

GX*: G stands for glycerol, X stands for glycerol phr*, which is glycerol weight amount per hundred parts of silicone.

Stability and Morphology of the Emulsions: G20_SA as Example

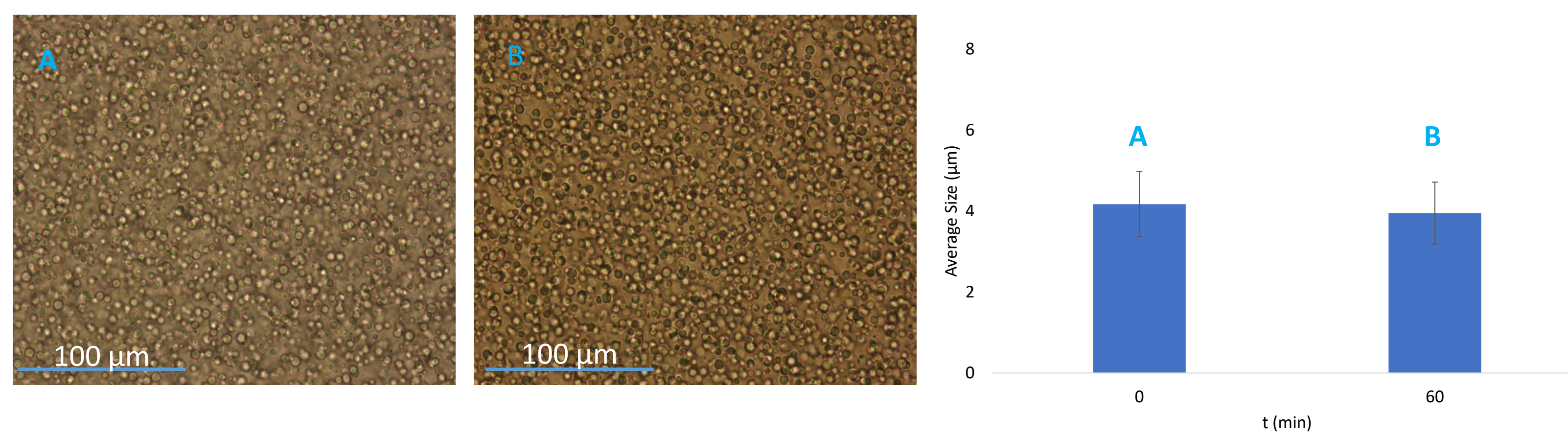
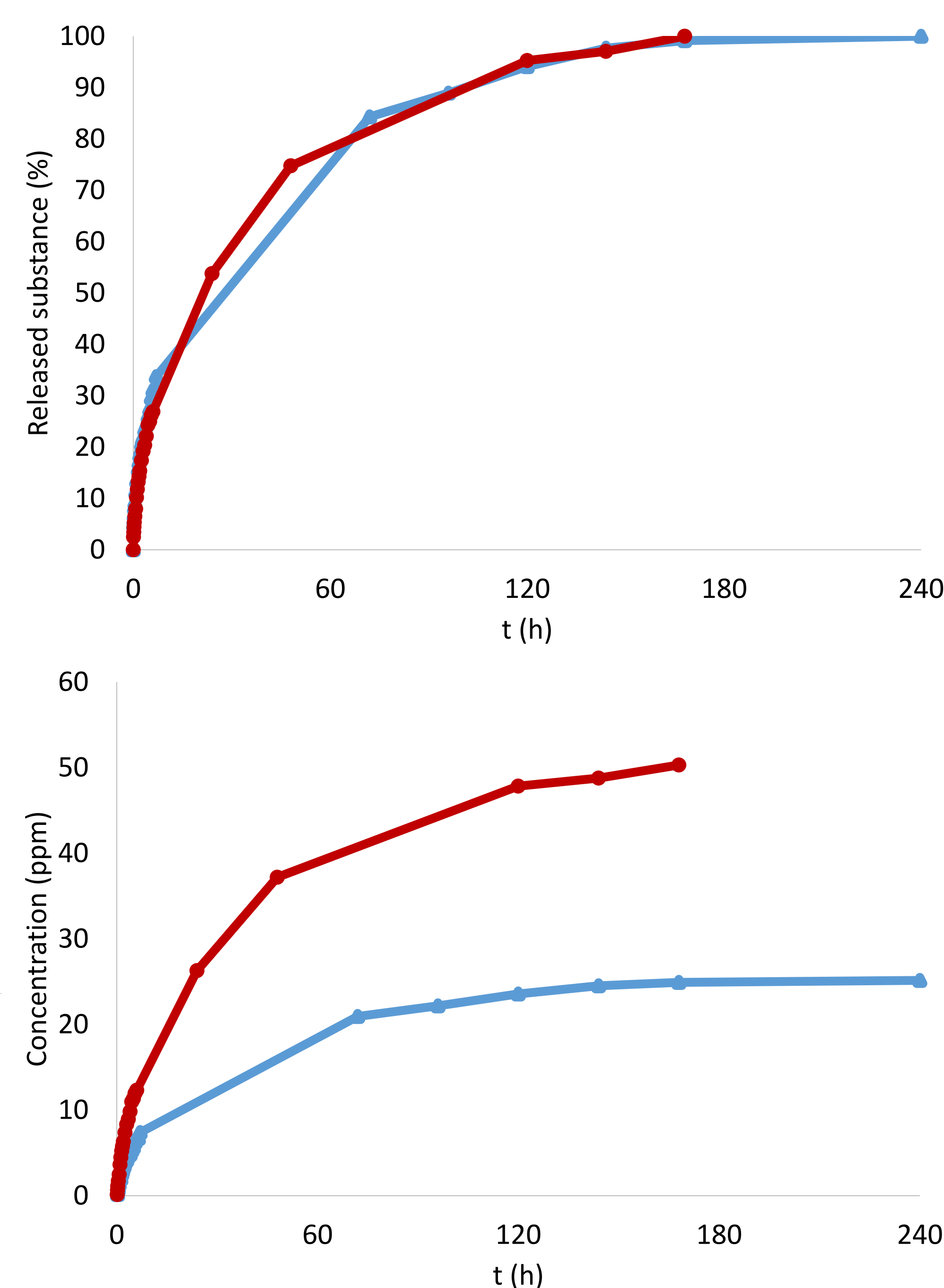


Figure: Glycerol domains incorporated in the silicone matrix characterized by optical microscope. The emulsions were investigated with respect to the stability during 60 min. Complete curing is known to occur after this time at room temperature and the systems can be assumed to be immobilized with no further changes expected. Specifically, we studied changes in size of the glycerol domains over this time period. Pictures refer to a) t = 0 and b) t = 60 min after the formation of the emulsions. The relative average glycerol domain sizes are shown. The results presented in Figure highlighted the stability of glycerol domains size over 60 min, since no changes were observed.

Release of Active Compounds: G20_SA and G40_SA Profiles



References

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3. P. Mazurek, S. Hvilsted, A. L. Skov, *Green silicone elastomer obtained from a counterintuitively stable mixture of glycerol and PDMS*, *Polymer*, 2016, **87**, 1-7.

Acknowledgment

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